

WE CLAIM:

1. A power adapter for a heater for heating a cylindrical nozzle extending from an injection molding system, said power adapter comprising:

a base mounted on the molding system around the nozzle, said base comprising at least one layer proximate the molding system and one layer distal the molding system, wherein said proximate layer has a bore extending therein having a diameter approximately equal to a diameter of the heater including termination plates of the heater, and said distal layer has a bore extending therethrough having a diameter approximately equal to the diameter of the heater excluding any termination plates of the heater;

a plurality of recesses in a side wall of said distal layer bore, each said recess adapted to allow a termination plate of the heater to pass therethrough and into said proximate layer bore;

a plurality of contacts embedded in a side wall of said proximate layer bore and corresponding in number to the number of said recesses; and

channels located within said base adapted to house leads from a power source between said contacts and a point external of said base.

2. The power adapter of claim 1, further comprising one or more stops projecting from the side wall of said wall of said proximate layer bore and adapted to prevent rotation of the termination in a given direction beyond said stops.

3. The power adapter of claim 2, wherein said contacts are compliant and embedded in the side wall of the proximate layer so as to protrude from that side wall.

4. The power adapter of claim 3, further comprising an intermediate layer between said proximate and distal layers.

5. The power adapter of claim 3, wherein the mounting of said base to the molding system is direct.

6. The power adapter of claim 3, wherein the mounting of said base to the molding system is indirect, there being a flange on the nozzle therebetween.

7. The power adapter of claim 3, wherein said channels run parallel to said bores.

8. The power adapter of claim 7, wherein said channels exit said base on a surface of said distal layer opposite the molding system.

9. The power adapter of claim 3, wherein said layers are aligned in a manner such that:

an end of the heater with termination plates will pass through said distal layer, the termination plates specifically passing through said recesses;

the end of the heater with termination plates will be engaged directly or indirectly by the molding system;

the termination plates can be rotated to abut said contacts; and

with the termination plates abutting said contacts, the termination plates cannot be withdrawn through said distal layer.

10. The power adapter of claim 9, wherein the stops are positioned to allow rotation of the terminal plates and thereby the heater only in the clockwise direction following heater insertion and to allow rotation of the terminal plates and thereby the heater only in the counter-clockwise direction from the position where the termination plates abut said contacts.

11. The power adapter of claim 3, wherein said contacts consist of a metal strip adapted to fit into a groove of the termination plates.

12. The power adapter of claim 3, where the proximate layer consists of a ceramic thermal insulator.

13. A method of terminating a thick film heater comprising the steps of:

providing a heater and a plurality of termination plates, the heater having at least one thick film resistive heating element, each heating element having two end portions adapted to contact the termination plates;

applying a conductive noble-metal-based bonding agent to a contact surface between the termination plates and the end portions of the heating element; and

affixing a termination plate to each end portion of the heating element, the bonding agent being disposed therebetween, wherein the termination plate is adapted to receive power for the heating element from an external power source.

14. The method of claim 13, wherein the noble-metal-based bonding agent is silver-based.

15. The method of claim 13, further comprising the step of attaching a power conductor to each termination plate.

16. The method of claim 15, wherein the power conductors are attached by welding.

17. The method of claim 15, wherein the power conductors are attached by soldering.

18. The method of claim 13, wherein the termination plates are threaded studs.

19. The method of claim 13, wherein the termination plates are "L" shaped.

20. The method of claim ~~14~~, wherein the bonding agent consists of an ink comprised primarily of a silver alloy.

21. The method of claim ~~20~~, wherein the bonding agent further comprises a glass frit.

22. The method of claim ~~13~~, wherein the bonding agent comprises a silver-palladium alloy.

23. The method of claim ~~13~~, wherein the heating element is protected by a dielectric except for a portion at each end, and wherein the termination plates are positioned to cover the unprotected portion of the heating element.

24. The method of claim ~~13~~, wherein said bonding agent has a melting point of at least 900°C.

25. The method of claim ~~13~~, wherein the bonding agent is applied by silk screen printing.

26. The method of claim ~~13~~, wherein the bonding agent is applied with a paint brush.

27. The method of claim ~~13~~, wherein the bonding agent is applied by spray coating.

28. The method of claim ~~13~~, wherein the bonding agent is applied by dipping the ends of the heating element in the bonding agent.

29. The method of claim ~~13~~, wherein the bonding agent is applied using a green tape method.

30. The method of claim ~~13~~, further comprising the final step of firing the bonding agent until the bonding agent has sintered thereby forming a bond between the terminal plate and the heating element.

31. The method of claim ~~30~~, wherein the baking takes place between 700°C and 900°C.

32. The method of claim 13, wherein the termination plate is curved to match the curvature of a substrate of the heater.

MC 33. The method of claim 15 further comprising a final step of shielding the termination plate and a portion of the power conductor with a protective layer.

34. The method of claim 33, wherein the protective layer comprises glass insulation.

35. The method of claim 33, wherein the protective layer comprises a polymer.

36. The method of claim 33, wherein the protective layer comprises a ceramic.

37. The method of claim 13, wherein at least one of the heating elements is adapted for use with 3-phase power, the heating element having three end portions, each adapted to contact a termination plate.

38. The method of claim 13, wherein the bonding agent is applied directly to the terminal plate.

39. The method of claim 13, wherein the bonding agent is applied directly to the end portion of the heating element.

40. The method of claim 15, wherein the power conductors are attached by brazing.

41. The method of claim 22, wherein the bonding agent consists of an ink comprised primarily of a silver alloy.

42. The method of claim 22, wherein the bonding agent further comprises a glass frit.